

Every Kitchen is a Chemistry Lab

Project Summary

For this project, a series of food science projects were created to emphasize different principles used in the baking process. The projects were geared towards third and fourth grade children, with the purpose of encouraging them to learn the art of cooking, create an awareness of the chemistry principles involved in cooking. Lesson plans were written with the intent of being used in classrooms and smaller educational experiences by the Utah State Extension Service. The program also includes evaluation worksheets of the experiment, and a *Try it at Home!* section to provide students with a way to practice the principles learned, interact with parents, best of all: Taste!

Introduction

Cooking is a fundamental life-skill. It is a requirement for resourceful, healthier living. It strengthens cultural ties, and unites family members. The need to teach basic cooking skills in schools has increased over the years. The fast-paced lifestyle of today has prevented many parents from learning cooking skills, or allowed them to teach their children these skills (Gates, Short, 2002). Basic cooking skills also provide a practical way to use math, reading, and logic skills that are taught in schools. It provides the hands-on learning that children love. Cooking education contributes to a positive self-image and well-being for a child (New York New Amsterdam News, 2004) throughout their entire life.

Need for Skills

Cooking skills have long been viewed as part of essential education. It has been the focus of several service missions to African countries since 1920 (Higgs, 2004). Those in lower economic conditions commonly lack the ability to prepare nutritious meals. Learning food preparation skills and budgeting can greatly reduce a family's food insecurity and become a vital

step towards becoming self-sufficient (Mattern, (2005). A recent study in United Kingdom discovered that 90% of 12-13 year-old children knew how to use the internet, but only 50% knew how to boil an egg (Cruickshank, 2005). These and other statistics have encouraged the government to start an after-school “Food Club” for underprivileged youth. Parents especially have been appreciative of the results. Children have participated more in home food decisions, and preparation (Hyland, 2006).

Learning these food preparation skills also helped the children be more aware of nutrition, encouraged the youth to make healthier food choices at home (Hyland, 2006). A 1999 USDA study found that foods baked at home contained more of vital nutrients than ready-prepared items (Clabber Girl, 2006). Many families are resorting to prepared foods simply because they lack the skills to prepare a meal (Gates, Stort, 2002).

Having basic cooking and budgeting skills can mean the difference between malnutrition and health during times of economic hardship. It has also been proven that for every dollar that is spent on nutrition education saves over ten dollars in long-term public health costs (Mattern, 2005). Emphasizing the importance of these fundamental skills throughout life can benefit entire communities as well as individuals.

Involving Science

The basis of a science project is that it must follow scientific method. It is an attempt to answer a specific question. Research starts with a hypothesis, and ends with a conclusion or results. One of the most vital parts of an experiment is that there must always have a control. Little can be discovered about the variations without the help of something constant. The basis of an experiment is that questions are asked, and comparisons are made between something that is known and an unknown (Zinnen, 2005).

Research found that changing the ratio of these acid/base compounds can also affect the volume, texture, color and flavor of the product. In an experiment conducted for this project, it was found that increased amounts of baking soda (double amount) added to a basic yellow cake batter would increase the yellow color of the product. Adversely, this also gave a “grainy” texture to the product, reduced volume, and left a bitter after-taste. The control, which used commercial baking powder, was light and fluffy, with no after-taste. The color was very light. Without the use of a control, the changes to the cake could have gone un-noticed.

A challenge with experiments involving children is the amount of variables that can exist in cooking. When testing the effect of the amount of baking powder in a cupcake, volume can also be affected by the amount of stirring, if ingredients were properly measured, and temperature variations among ovens. This increases the amount of education and direction that must be included to clearly instruct students, so that the manipulation of multiple variables can be as restricted as much as possible.

Children are full of questions and curiosity about everyday life. All experiments attempt to take ordinary items and show a unique perspective. The history and science of many items were researched and found to be intriguing by adults and children alike. For example, chemical leaveners such as baking powder and baking soda are found in quick breads and have been used since the late 1700’s. Some of the first reactions used were baking soda and a variety of acid compounds varying from potash to buttermilk.

When baking powder was first introduced in 1854, it was considered a great luxury. Having any kind of leavener that could be prepared faster than yeast was a wonderful convince. Baking powder became the most popular of chemical leaveners quickly because it was a shelf-stable item that did not require any pre-prepared ingredients such as “clabbered” milk (sour milk)

or would leave bitter after-tastes like potash (Clabber Girl, 2006). Potash is a combination of potassium carbonate and similar salts. It is commonly used in soap and fertilizer (Potash, 2006).

Baking powder is now a common household item. So common, that the few people are aware of the ancient science is involved in this process. Another experiment was written to illustrate the difference between baking powder and baking soda reacted with different acids. The similarities and differences were then discussed. During several presentations of this project, children were wide-eyed and thoroughly enjoyed the speed and intensity of the acid/base reactions. They were also shocked at the similarity between a common cooking ingredient, and the ever-popular science fair volcanoes.

Increasing Family Interaction

Food also represents emotional ties to country, culture, and safety. It is core to family traditions and lifestyle. It distinguishes individuals, families, and cultures, but also creates bonds of friendship and unity. In some countries, if their food is rejected, it is considered a rejection of the individual. Lesley Johnson describes her experiences cooking with her grandmothers, and learning family recipes, and how it creates family interaction:

That's the thing about cooking: Sure, eating fuels our bodies and keeps us alive, but to so many people, it is the act, the art of cooking that gives sustenance to the soul. It's family history—a common experience passed down throughout generations. . . It anchors us to our past (Johnson, 2005).

Learning new skills together in the kitchen can continue and create more “common [experiences]” that can be passed to the future generations as well strengthening current ties. In the UK study, parents greatly enjoyed the increased participation in family meal planning and preparing, and the children also enjoyed learning new skills (Hyland, 2006). Harrison feels that

one reason families are not cooking meals together at home is because young parents are spending more time at work, and a good many have never been taught basic cooking skills. She stresses the need for the most basic skills to be taught, because they can be adapted to nearly any recipe (Short, Gates, 2002).

Conclusion

“Teaching cookery, food hygiene, nutrition, budgeting and parenting skills [are] fundamental to the nation’s well-being” (Short, Gates, 2002). It is the hope that through this project, children and adults alike will be able to better understand the science of foods and cooking, and discover greater enjoyment through increased parent-child interactions and vital skills. Cooking gives them a chance to apply reading and math skills, find ways to answer questions, evaluate the cause and effect of actions taken, learn the importance of event-sequencing, and calculating (Clabber Girl, 2006). Assisting in the kitchen and contributing to food selection and preparation increases self-worth, and using healthier ingredients places children on a path towards a healthier, happier life (New York Amsterdam News, 2004) and influence generations to come.

Presentation Evaluation

Presentations were given at Adam’s Elementary to the three third-grade classes, and a smaller presentation to a Cub Scout troop. These presentations also came to show that children prefer more action than talk, and love to touch, feel, and be involved. It is believed that parent-child interactions by sparking interest through the science of the demonstrations, and providing a fun but easy “homework” assignment through the *Try it at Home!* section. A participant said it best (while jumping up and down) “Yeah! *I* can make these at home with my mom!”

References

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